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I, JANENE PEISKER, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2002952390 for a patent by MULTIFLO AUSTRALIA PTY LTD as filed on 31 October 2002.



WITNESS my hand this
Twelfth day of November 2003

JANENE PEISKER
TEAM LEADER EXAMINATION
SUPPORT AND SALES

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Patents Act 1990

PROVISIONAL SPECIFICATION

Invention Title: "VALVE ASSEMBLY"

The invention is described in the following statement:

TITLE**"VALVE ASSEMBLY"**FIELD OF THE INVENTION

This invention relates to a valve assembly. In particular, the
5 invention relates to a valve assembly used to protect fuel tanks from being
overfilled with fuel and therefore the invention will be described in this
context. However, it is envisaged that the valve assembly may be used to
protect the other types of containers from being overfilled with other types of
fluid.

10 BACKGROUND OF THE INVENTION

For many years large machinery fitted with fuel tanks have
been equipped with fast fill systems to enable rapid filling of large capacity
fuel tanks. The existing fast fill fuel systems rely on an air vent that prevents
air from escaping the fuel tank when the required level of fuel has been
15 attained. This causes pressure in the fuel tank to increase to a level that
automatically shuts-off a fuel supply nozzle.

A major concern of this system is that when the fuel level
activates the shut-off for the fuel supply nozzle, the shut-off can be
overridden and fuel can continue to be forced into the fuel tank above the
20 normal level. This can cause the fuel tank to rupture from the high pressure
attained when filling.

US Patent No. 6,311,723, (by the applicant), has addressed
this problem by devising a flow control valve assembly that prevents the build-
up of pressure within the fuel tank during and after filling. The flow control

valve assembly also prevents the supply fuel nozzle from being overridden thus preventing the possibility of overfilling.

The control valve assembly of US Patent No. 6,311,723 uses a float valve to determine when the level of fuel in the fuel tank is at a desired level. When the desired level of fuel has been attained, the float valve is used to block the flow of fuel through a bleed pipe to stop the flow of fuel through a control valve. An open breather is provided within the fuel tank to allow gas to escape from the fuel tank during filling to prevent the fuel tank rupturing.

10 The flow control valve assembly operates very effectively on machinery that is predominately stationary. However, when the control valve assembly is mounted to vehicles' fuel tanks, such as those located in trucks and excavators, some difficulties may be experienced during movement of the vehicle.

15 One problem that may be experienced is that the float valve may become broken. The float valve comprises a float that is mounted on a pivotally movable elongate arm. This arm can break due to the large forces that are exerted on the arm by the surging fuel caused by movement of the vehicle.

20 In the event that the control valve assembly fails, in this or any other manner, the fuel supply nozzle will continue to fill the tank and pass fuel through the open breather until the nozzle is shut-off manually. This may lead to many hundreds or even thousands of litres of fuel being wasted and the spilt fuel being disposed.

Another problem that occurs is fuel is passed through the open breather during movement of the vehicle. Fuel surges cause fuel to flow through the open breather and escape the fuel tank. Again, this wastes fuel and is environmentally unfriendly. Further, the spill fuel also creates a fire hazard.

5. vehicle hazard.

OBJECT OF THE INVENTION

It is an object of the invention to overcome or alleviate one or more of the above disadvantages or to provide the consumer with a useful or commercial choice.

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SUMMARY OF THE INVENTION

In one form, although not necessarily the only or broadest form, the invention resides in a valve assembly able to be mounted with a liquid container, the valve assembly comprising:

15. housing;

a passageway float valve mounted within the housing, the passageway float valve movable between an open position to allow gas to pass through the passageway and a closed position that prevents liquid from passing through the passageway;

20. an liquid inlet, forming part of the housing, the liquid inlet allowing fluid to pass into the container; and

an inlet float valve mounted within the housing, the inlet float valve movable between an open position that permits the flow of liquid through the liquid inlet and a closed position that prevents the flow of fluid

through the liquid inlet.

Preferably, the valve assembly also includes a relief valve that is movable between an open position and a closed position to allow pressure to be relieved from the container.

5. Preferably, the housing is cylindrical.

Preferably, the float valve includes a float and a stem. A valve seal may be located adjacent the end of the stem.

Preferably, a fuel chamber is located adjacent the inlet in which fuel is passed. A shelter may be provided within the fuel chamber in which

10 an end of the stem is located when the float valve assembly is in the open position

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will be described with reference to the accompanying drawings in which:

15 FIG. 1 is a section side view of a valve assembly with a breather float valve and an inlet float valve in an open position according to an embodiment of the invention;

FIG. 2 is a section side view of the valve assembly of FIG. 1 with the breather float valve and the inlet float valve in a closed position; and

20 FIG. 3 is a section side view of the valve assembly of FIG. 1 with a relief valve in an open position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a valve assembly 10 that is primarily used in a fuel tank. The valve assembly 10 is normally used in conjunction with a

control valve (not shown) to prevent fuel from entering the fuel tank when the fuel tank has reached a predetermined level.

The valve assembly 10 comprises a housing 20 that is hollow and substantially cylindrical in shape. The housing 20 has several fuel holes 21 located along its length that allow fuel located within the fuel tank to pass in to the housing 20 and vice-versa.

An inlet 30 is provided at a lower end of the housing 20 through which passes fuel. The inlet 30 is fluidly connected to two separate screw threaded apertures 31 and 32 to which is attached a bleed pipe (not shown) 10 is connected to one of the apertures 31 or 32. The bleed pipe leads to the control valve to activate the control valve as in US patent No. 6 311 723. The screw-threaded apertures 31 and 32 allow the bleed pipe to be connected external or internal the fuel tank.

An inlet float valve 40 is housed in a lower end of the housing 20. The inlet float valve 40 is formed from a float 41 and stem 42. A valve seal 43 is located adjacent the end of the stem 42 for sealing the inlet 30.

The inlet float valve 40 is mounted within the housing so that the stem can reciprocate between an open position, in which fuel is able to pass through the bleed pipe and through the inlet into the fuel tank, and a closed position that prevents the flow of fuel through the inlet.

A fuel chamber 50 is located between the inlet and the apertures 31 and 32. The fuel chamber 50 provides a shelter 51 in which an end of the stem 42 is located when the inlet float valve 40 is in the open position.

The top of the housing 20 is open so that a passageway 60 is provided between the inside and outside of the fuel tank. This allows for gas to pass from within the fuel tank to the atmosphere so that the fuel tank does not rupture during filling of the fuel tank. A relief plate 71 is positioned within an upper end of the housing. Breather holes 72 are located within the relief plate. The breather holes 72 form part of the passageway 60.

5 A passageway float valve 80 is provided adjacent the breather holes. The passageway float valve 80 is formed from a float 81 and a rod 82. A platform 83 and the relief plate 71 are used to mount the rod 82. The 10 float 81 is able to reciprocate along the length of the rod between the relief plate and the platform 83.

The passageway float valve 80 is in an open position when the float 81 is located adjacent the platform 83 and gas is free to pass through the breather holes 72. The passageway float valve 80 is in a closed position 15 when the float is located over the breather holes 72 and fuel cannot pass through the breather holes 72.

A relief valve 70 is formed at adjacent a top end of the housing. The relief valve 70 is formed from the relief plate 71, a spring 73 and a cap 74. The relief plate is able to move within a skirt 22 formed at the top of the 20 housing 20. The skirt 22 has a number of circumferentially spaced relief holes 23. The spring 73 holds the relief plate at the base of the skirt 22. The spring 73 is held in position by a cap 74 that is located over the housing 20.

In use, the valve assembly 10 has a number of functions. In a fuelling normal operation, the inlet float valve 40 is in the open position such

that the stem 42 sits within the shelter 51 as shown in FIG. 1. The bleed pipe passes fuel in to the fuel chamber 50. The fuel then passes through the inlet 30, into the housing 20 and out the fuel holes 21 into the fuel tank. The stem 42 is not affected by the flow of the fuel through the inlet as any turbulence that is created by the fuel passing through the fuel chamber does not effect the valve seat.

As the fuel tank fills with fuel, the passageway 60 of the housing 20 also fills within of fuel to the same level. The float 41 rises within the housing until the valve seal 43 blocks the inlet 30 as shown in FIG. 2. The pressure of the fuel passes through the bleed pipe, as well as the float, maintains the valve seal 43 in position within the inlet 30. Once the inlet 30 is blocked, the bleed pipe fills with fuel causing the control valve to become closed and prevents further filling of the fuel tank.

When the vehicle is moving, the housing 20 prevents damage of the inlet float valve 40. The impact forces created by surging fuel within the fuel tank impact the housing 20 not the inlet float valve 40. The surging fuel can still extend up passageway 60 and up to the breather holes 72. The passageway float valve 80 prevents this surging fuel from escaping through the breather holes 72 as the passageway float 81 moves with the surging fuel blocking the breather holes 72 as shown in FIG. 2.

The passageway float valve 80 also provides a fail safe during fuelling of the fuel tank. If the bleed pipe is severed or the control valve fails or the inlet float valve fails, then a fuel supply nozzle (not shown) will continue to pump fuel into the fuel tank. The fuel tank will fill with fuel until

the passageway float 81 moves to the closed position to block the breather holes 72. The continued fuelling of the fuel tank creates pressure within the fuel tank. When the fuel tank reaches a fuel nozzle shut off pressure, then the fuel supply nozzle will shut-off stopping the fuel tank from rupturing.

5 If the fuel supply nozzle does not shut off automatically due to a mechanical fault, then the fuel supply nozzle will continue to supply fuel to the fuel tank. This causes the pressure within the fuel tank to increase. At a pressure less than the rupture pressure of the tank, the pressure relief valve is opened as shown in FIG. 3. This occurs when the fuel tank pressure 10 becomes greater than the spring pressure causing the relief plate 71 to move upwardly until it passes over the relief holes 23 in skirt 22. Fuel then passes from the tank, through the relief holes 23, into the cap 74 and through a cap hole 75. The fuel flowing from the cap 74 will indicate to an operator to shut the fuel supply nozzle off manually.

15 The valve assemble provides a number of advantages. Firstly, the valve assembly is not damaged by surging fuel making the valve assembly suitable for use in vehicles. Secondly, the passageway way valve prevents fuel from escaping the valve assembly when the fuel surges within the fuel tank during movement of the vehicle. Thirdly, in the event of failure 20 of the inlet float valve, control valve or bleed pipe, the passageway valve prevents the loss of fuel by blocking the breather holes causing pressure build up within the fuel tank and thus causing the fuel supply nozzle to shut off. Fourthly, the pressure relief valve prevents the fuel tank from rupturing from over pressurising of the fuel tank.

The valve assembly can be easily retro fitted or fitted into existing tanks. It is sized to fit into holes that are located in tanks for existing systems.

It should be appreciated that various other changes and
5. modifications may be made to the embodiment described without departing from the spirit or scope of the invention.

DATED this Thirtieth day of October 2002.

MULTIFLO AUSTRALIA PTY LTD

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By its Patent Attorneys

FISHER ADAMS KELLY

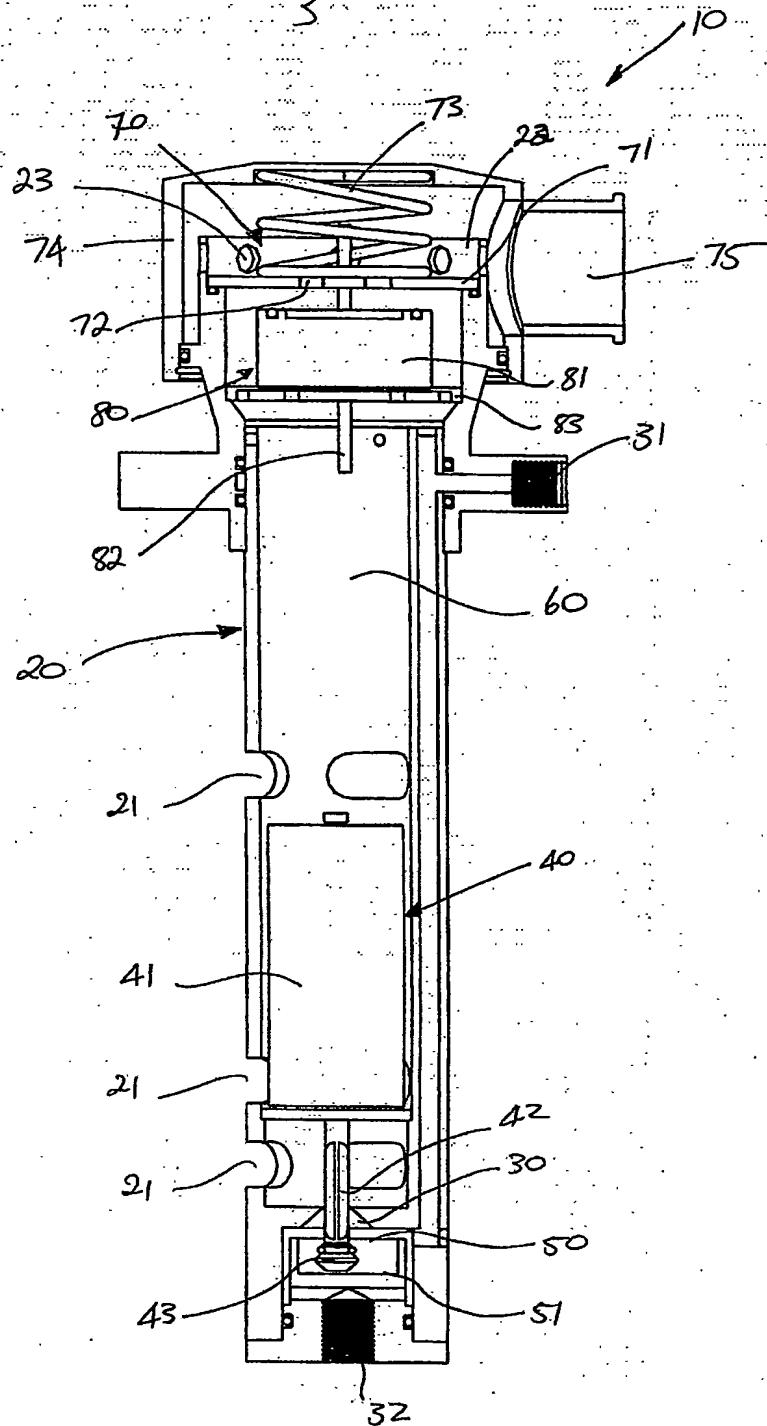


FIG 1

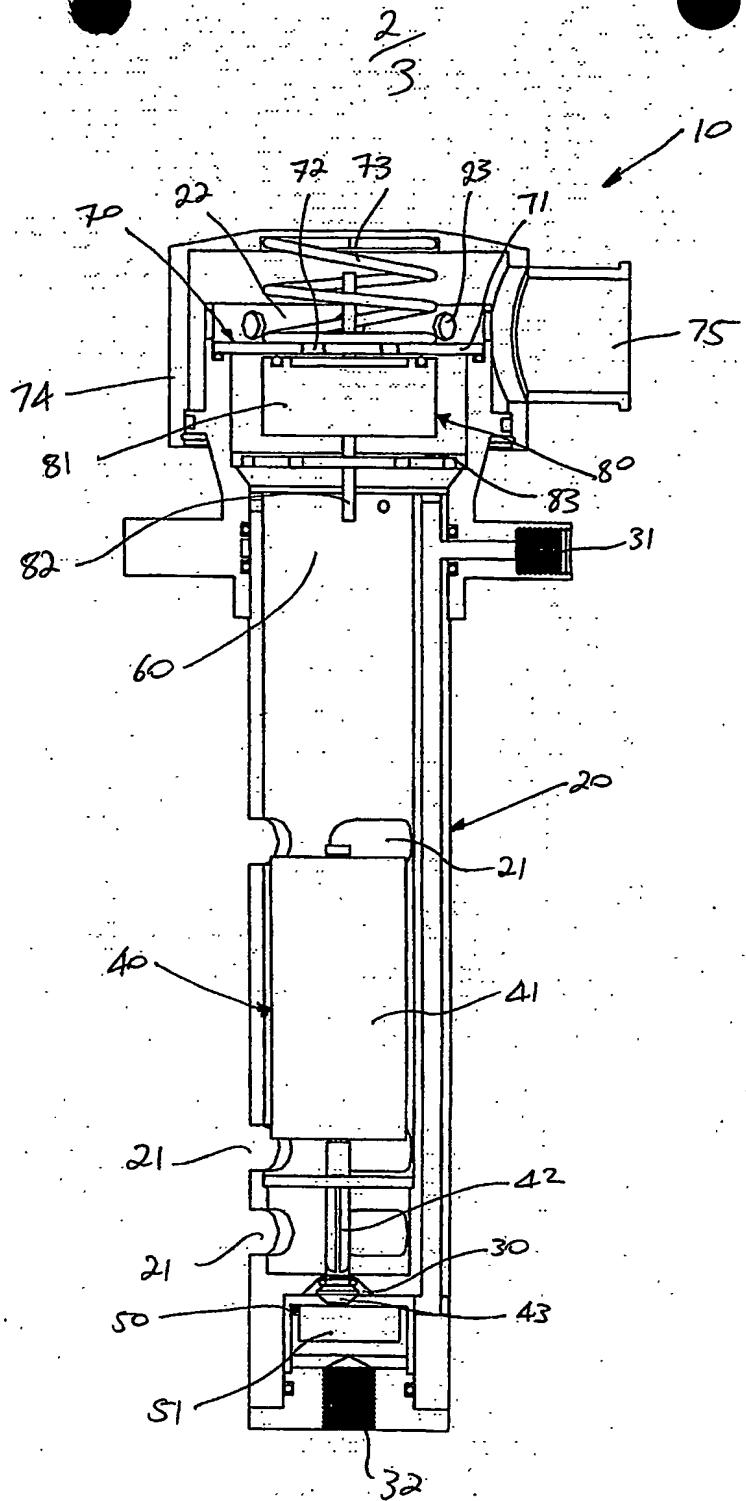
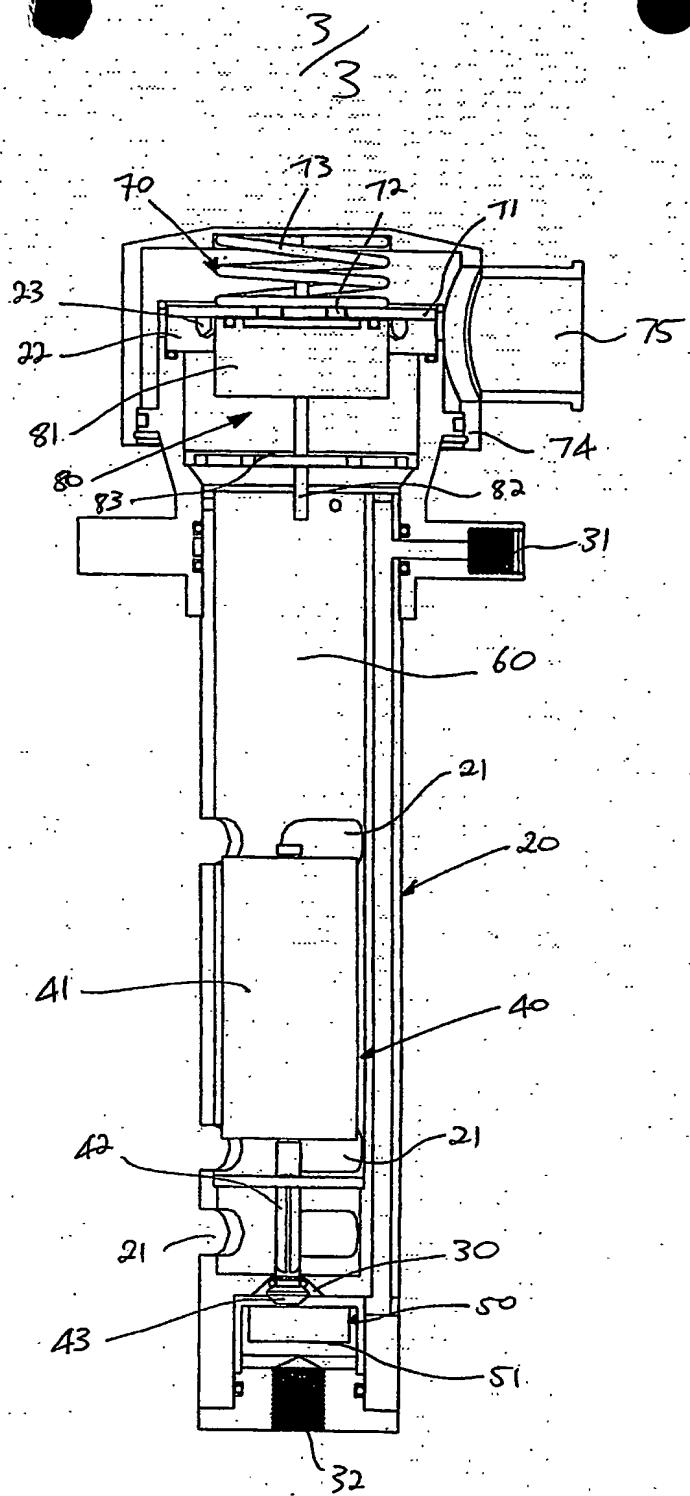


FIG. 2



F16 3.

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